

Groundwater Cleanup and Potable Water Supply – The Hinkley Experience

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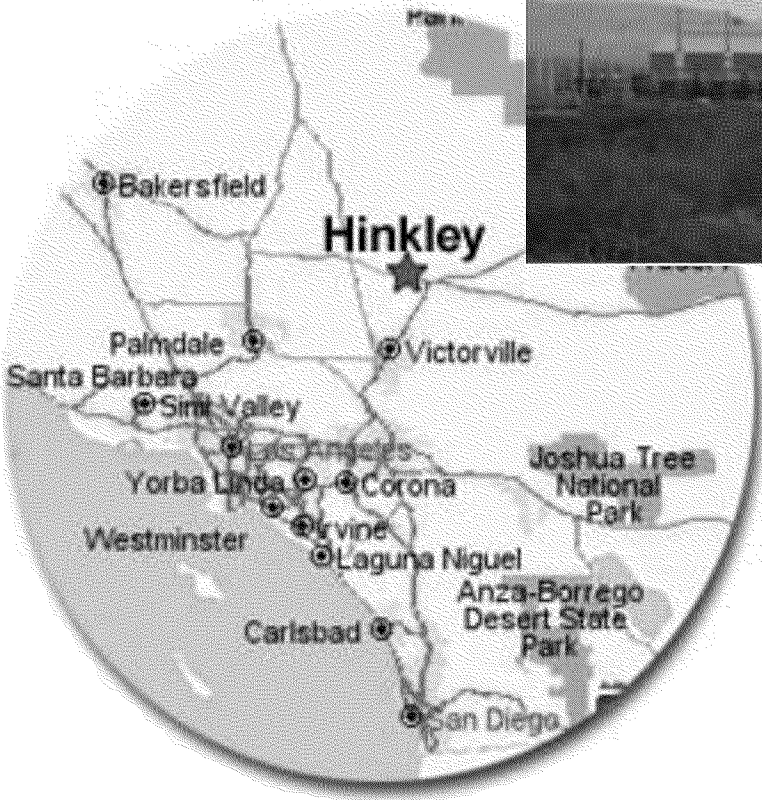
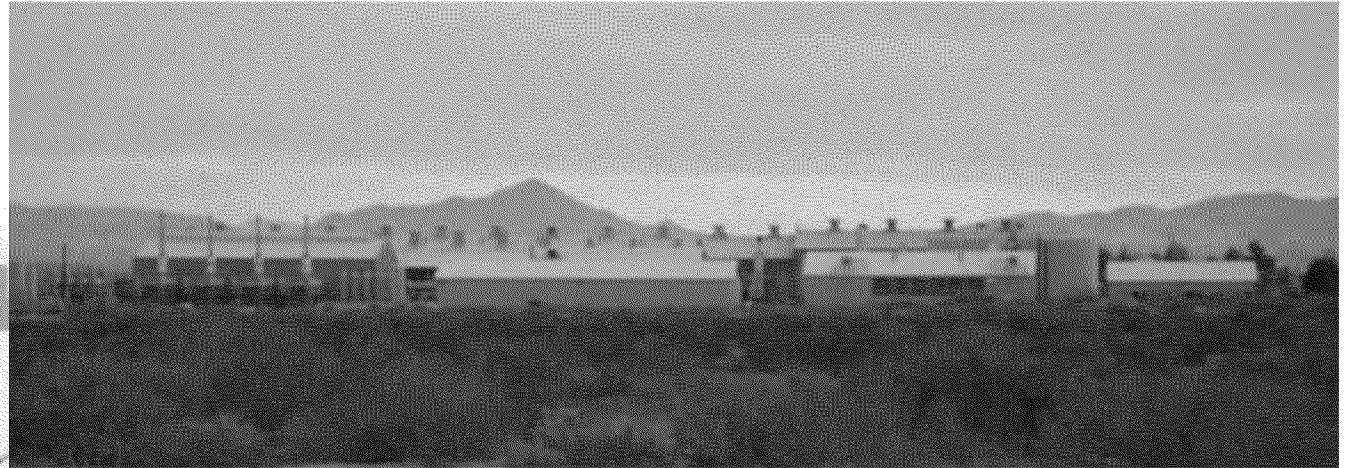
CH2M Hill



October 2013 AWWA Fall Conference, Sacramento, CA



Hinkley Compressor Station



- In operation since 1952
- 5 miles outside of Barstow
- Re-pressurize gas to push through PG&E's pipelines



Brief History



- 1952 – 1964
Cooling water containing hexavalent chromium (chromium six) to prevent corrosion was disposed of in unlined ponds



Regulatory Uncertainty

- **No current drinking water standard for chromium+6– 10 ug/L draft MCL August 2013**
 - Current Drinking Water Standards (maximum contaminant levels)-“total chromium” basis:
 - 100 µg/L: U.S. Environmental Protection Agency
 - 50 µg/L: California Department of Public Health
 - Currently adopted maximum background level at Hinkley: 3.1/3.2 ug/L CrVI/CrT
 - The California Office of Environmental Health Hazard Assessment in 2011 prepared a Public Health Goal (“PHG”) specific to hexavalent chromium – 0.02 ug/L
 - Water Board using PHG (0.02 ug/L) as standard in the absence of an MCL
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Regulatory Uncertainty (cont.)

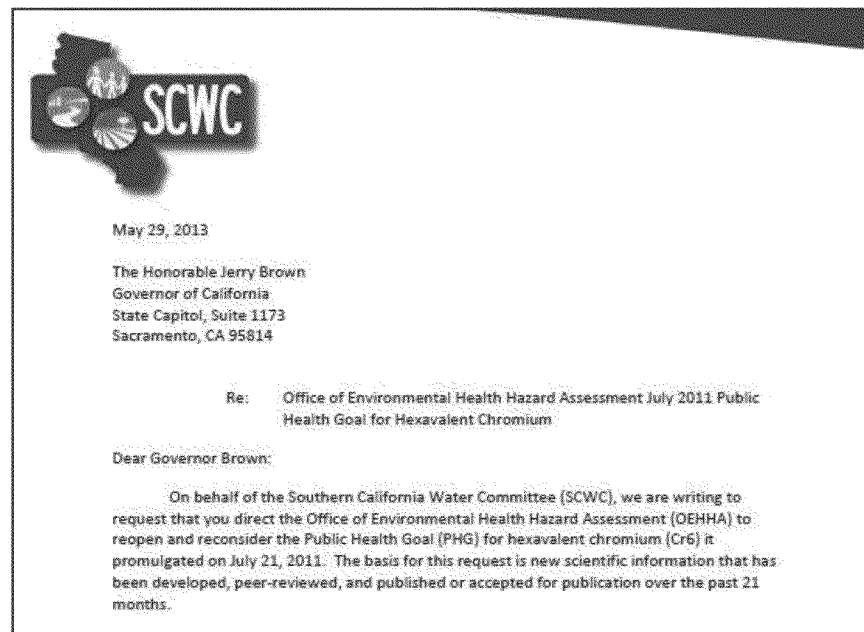
Source	Chromium 6 Level (ppb)
City of Davis (Well 01), Yolo County	19
Oak Trail Ranch Mutual Water (Well #2), Santa Barbara County	16
City of Sacramento (Well 154), Sacramento County	12.6
City of Sebastopol (Well 04), Sonoma County	9.7
California Water Service – Livermore (Well 09-01), Alameda County	7.5
City of Stockton (Well 19 – West Lane), San Joaquin County	5.9
West Palm Springs Village (Well 26), Riverside County	5.7
Golden State Water Co. – Lucerne (Sutter), San Bernardino County	4.6
Hinkley	3.1
Cal-Water Service Co. – Chico (Well 03_03), Butte County	2
Alameda County Water District (Mowry Well 06), Alameda County	1.5

- **State-wide issue: chromium six present in many community's water supply at these low levels**
- **Commercially available bottled water does not meet strict Water Board standards**



2013 - Revision to PHG?

- SCWC (Southern California Water Committee) - 200 member organizations include business, regional and local government, agricultural groups, labor unions, environmental organizations & water agencies
- May 29 2013 – Request to Gov Brown to direct OEHHA to reopen hexavalent chromium PHG





SCWC letter excerpts:

“ The new scientific information contradicts many of the assumptions and findings on which the PHG is based, most notably that:

- OEHHA’s reliance on “linear extrapolation” to establish low concentration Cr6 exposure risks does not utilize the best available science; and
- Human exposure to Cr6 at low levels does not pose an increased cancer risk.”

“...Cr6 is not carcinogenic at exposure levels that can reasonably be expected to occur in California drinking water ...

“ OEHHA can select a higher PHG for Cr6 that is still protective of public health. “

“Setting a MCL based on the current PHG could have potentially crippling financial impacts on California’s water systems without meaningfully benefiting public health.”



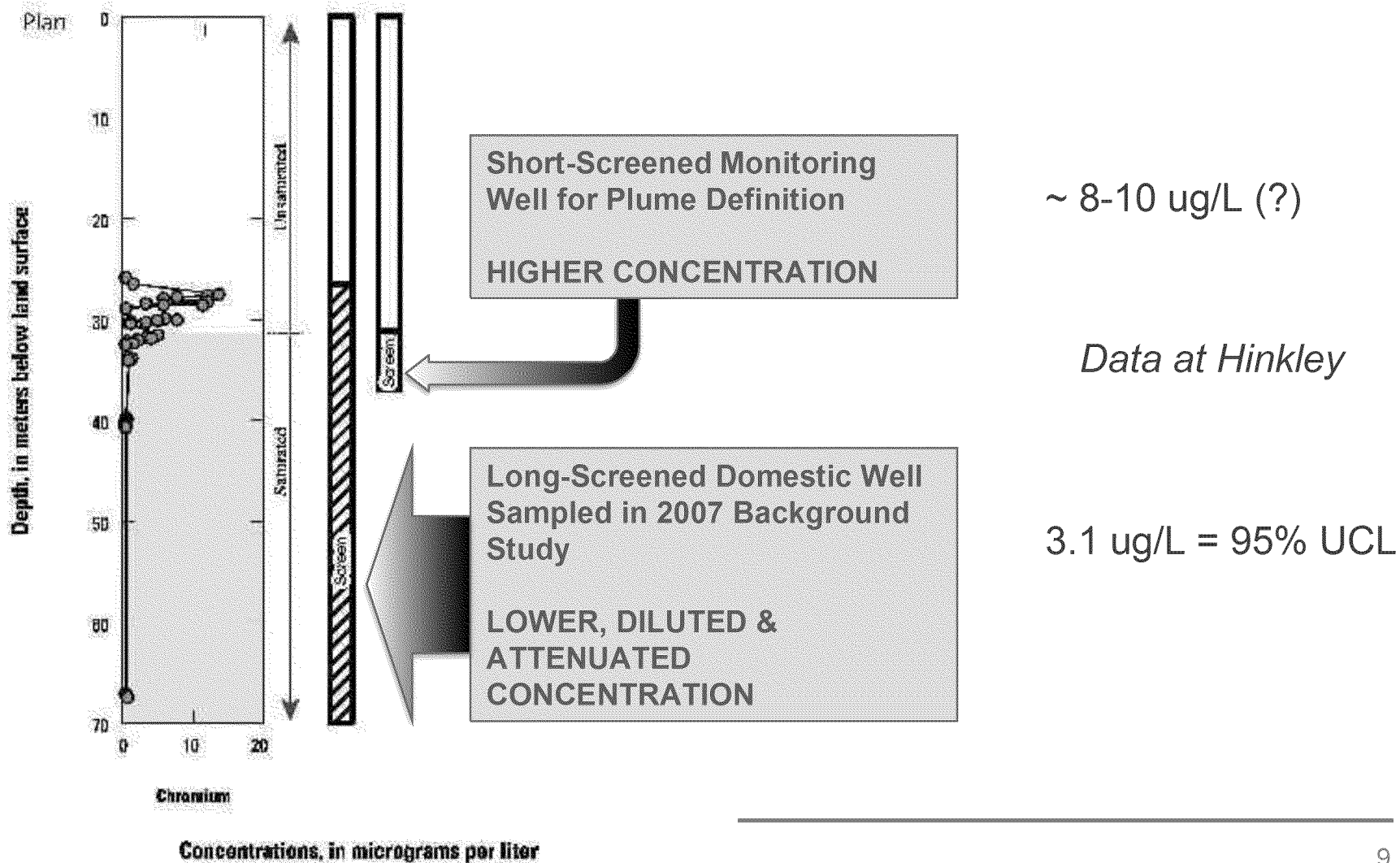
Background Cr Groundwater



- **Background = the level of a substance that exists in nature**
- **Naturally occurring chromium 6 in Hinkley at levels above the established program background level (3.1 ppb)**

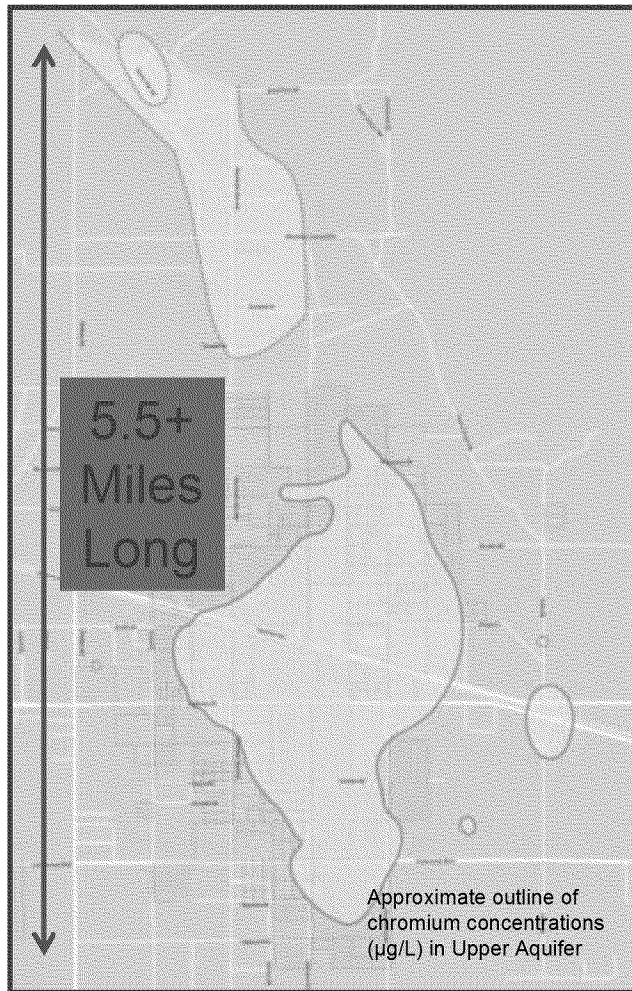


USGS Study Data – Background Cr Higher at the Water Table





Chromium 6 Plume

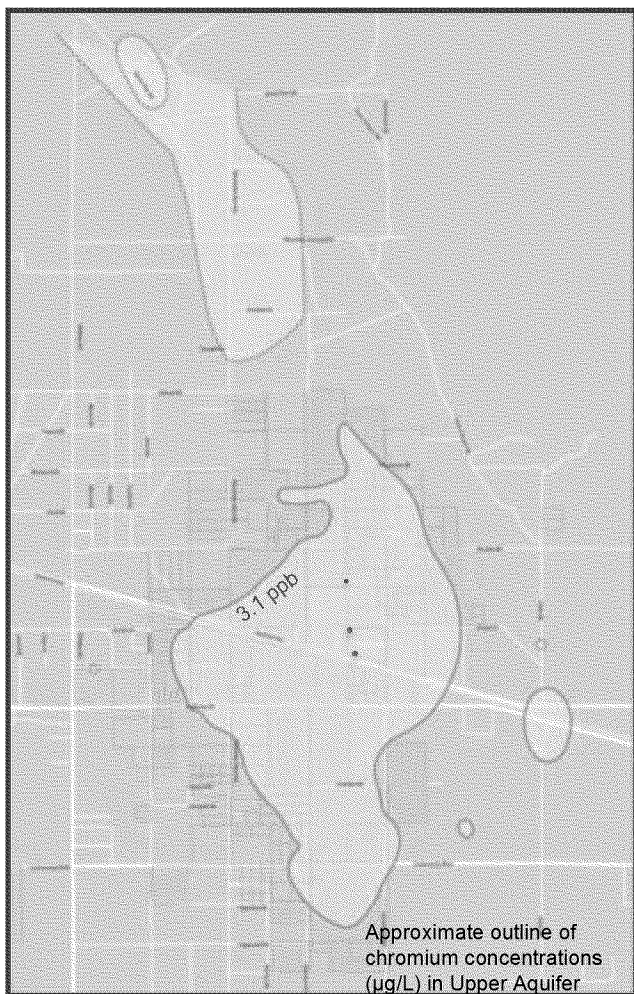


- Ongoing effort to define plume to currently defined background levels (3.1/3.2 µg/L)
- Working with USGS, community advisors and Water Board to refine site understanding and background levels
- Large areas of very diffuse concentrations in shallow aquifer
- >550 monitoring wells



Chromium Plume Definition

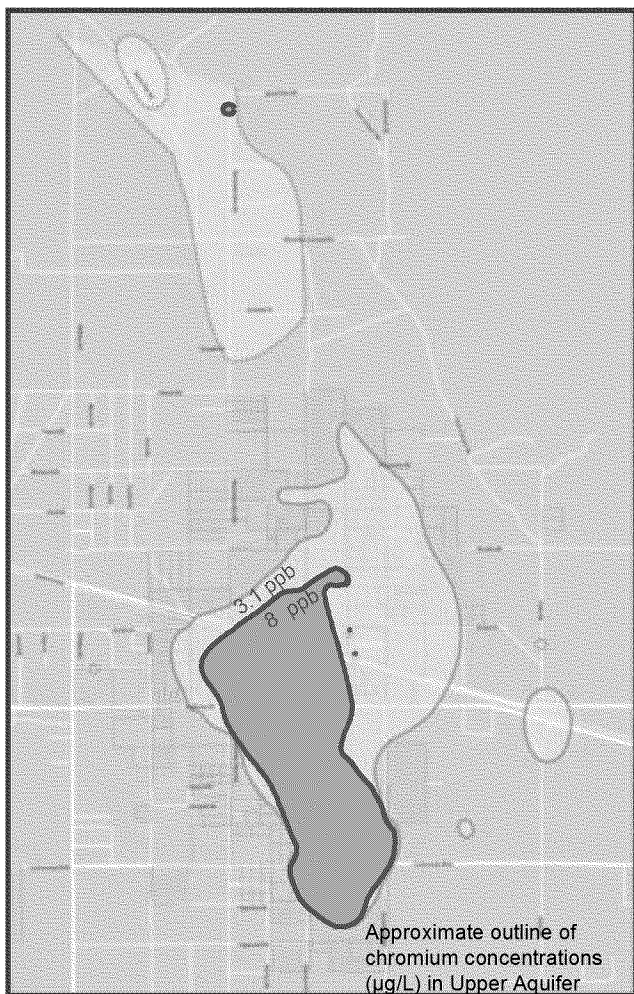
- **3.1 ppb: Current Background**





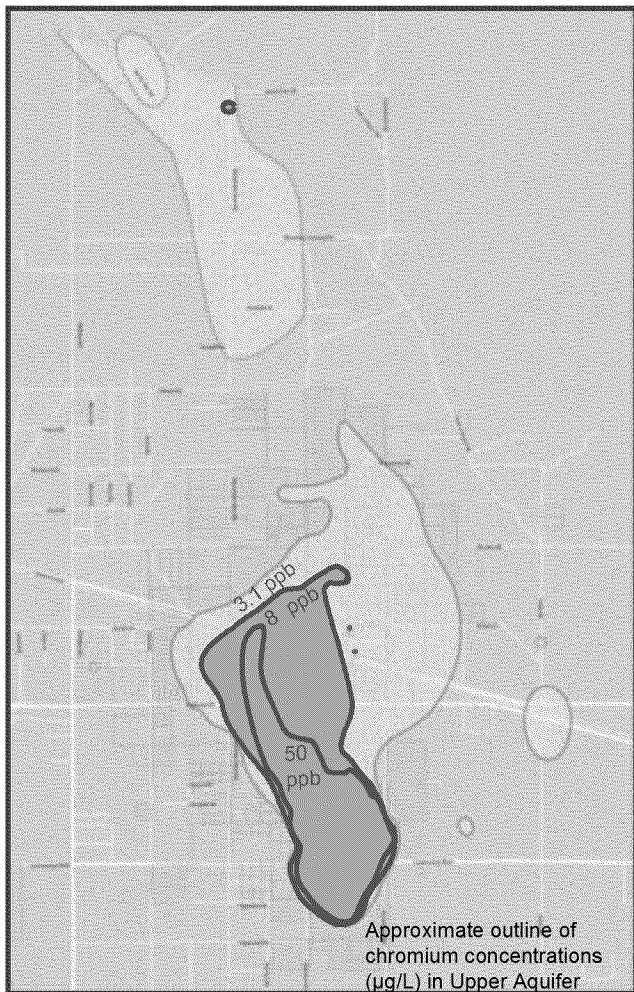
Chromium Plume Definition

- **3.1 ppb: Current Background**
- **8 ppb: Potential actual background**





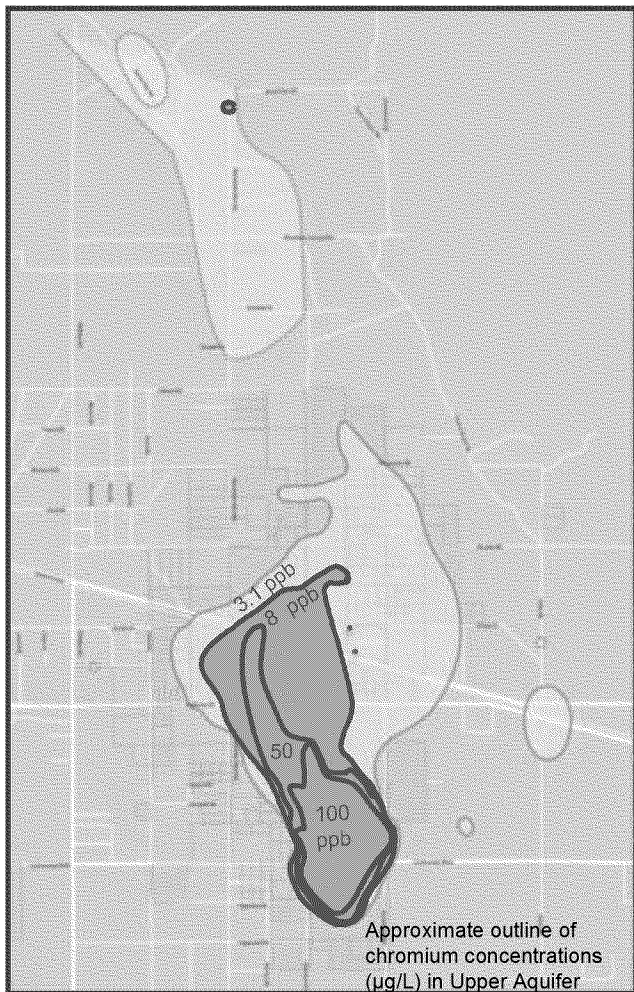
Chromium Plume Definition



- **3.1 ppb: Current Background**
- **8 ppb: Potential actual background**
- **50 ppb: California MCL for total chromium**



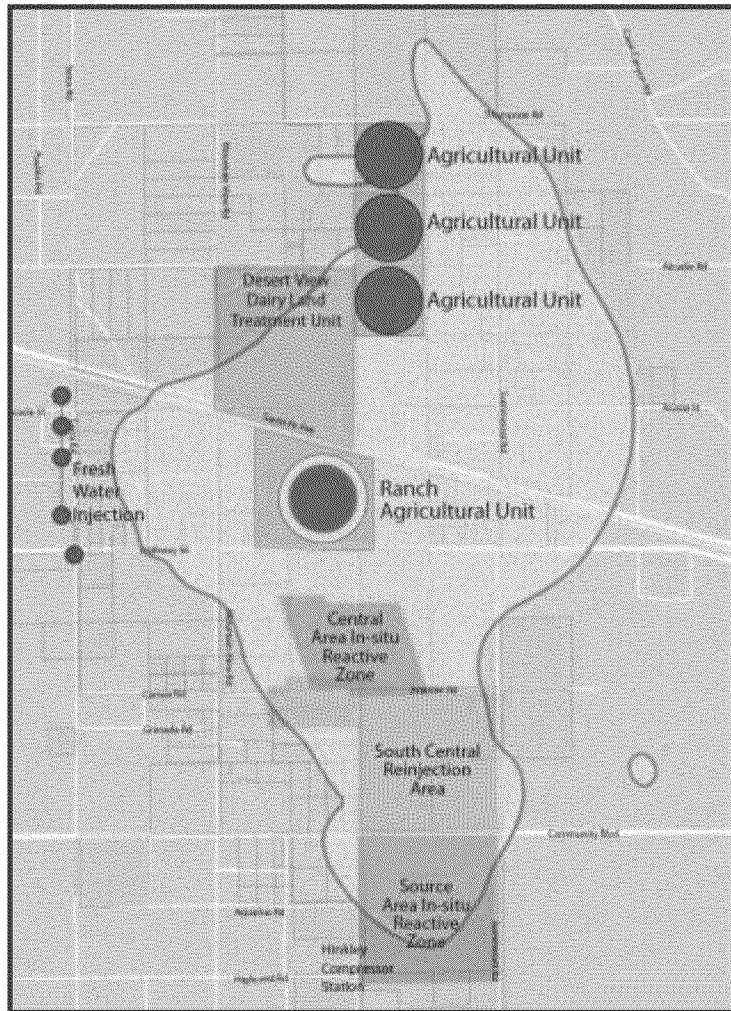
Chromium Plume Definition



- **3.1 ppb: Current Background**
- **8 ppb: Potential actual background**
- **50 ppb: California MCL for total chromium**
- **100 ppb: Federal MCL for total chromium (used in Arizona)**



Long-term Remediation



- Final remedy includes in-situ, agricultural treatment and fresh water injection wells.
- Highest concentrations treated in near-term.
- Lower concentrations will take nearly 40 years to complete.

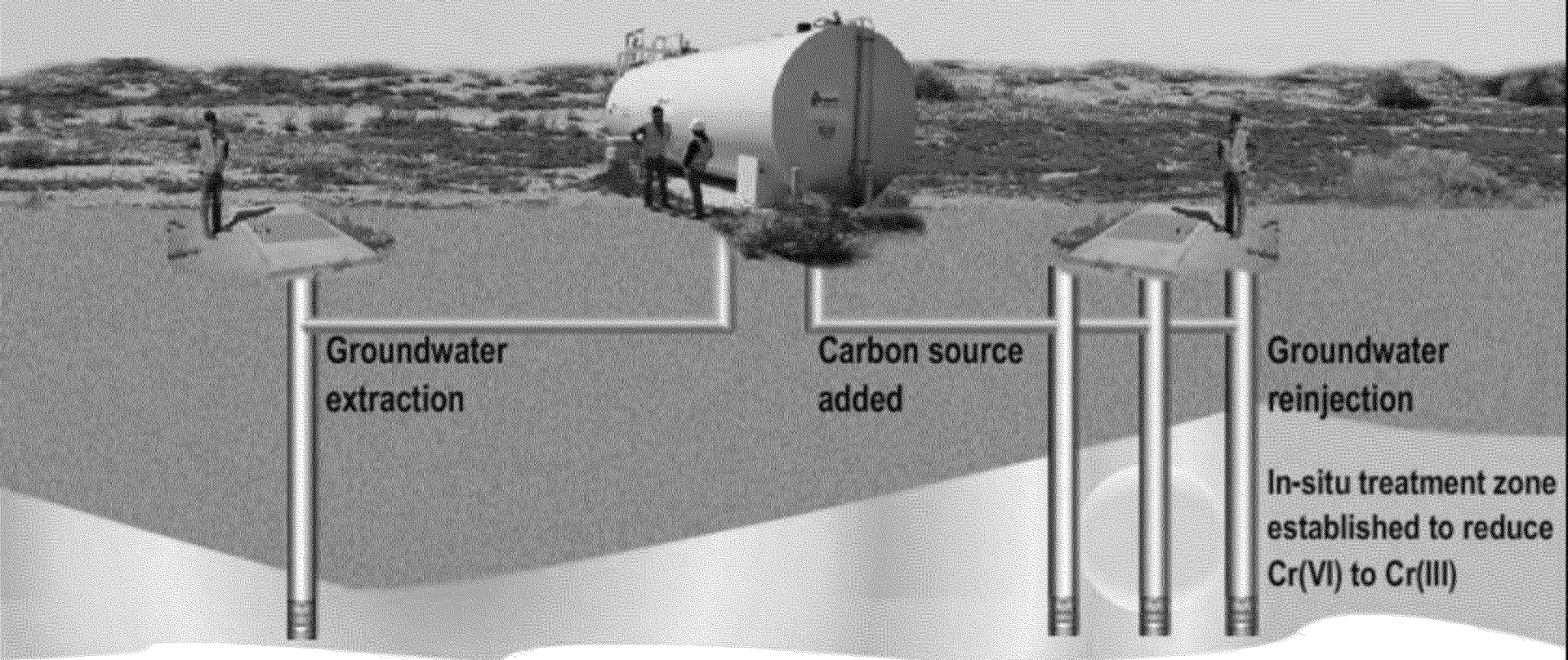


In-situ Remediation



- **Injection of Ethanol**
- **Stimulates growth of naturally occurring bacteria**
- **Converts Cr6 to Cr3**

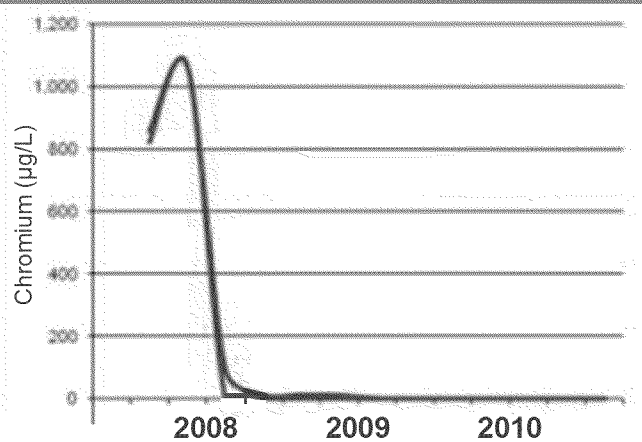
Carbon Amendment to Enhance In-situ Treatment





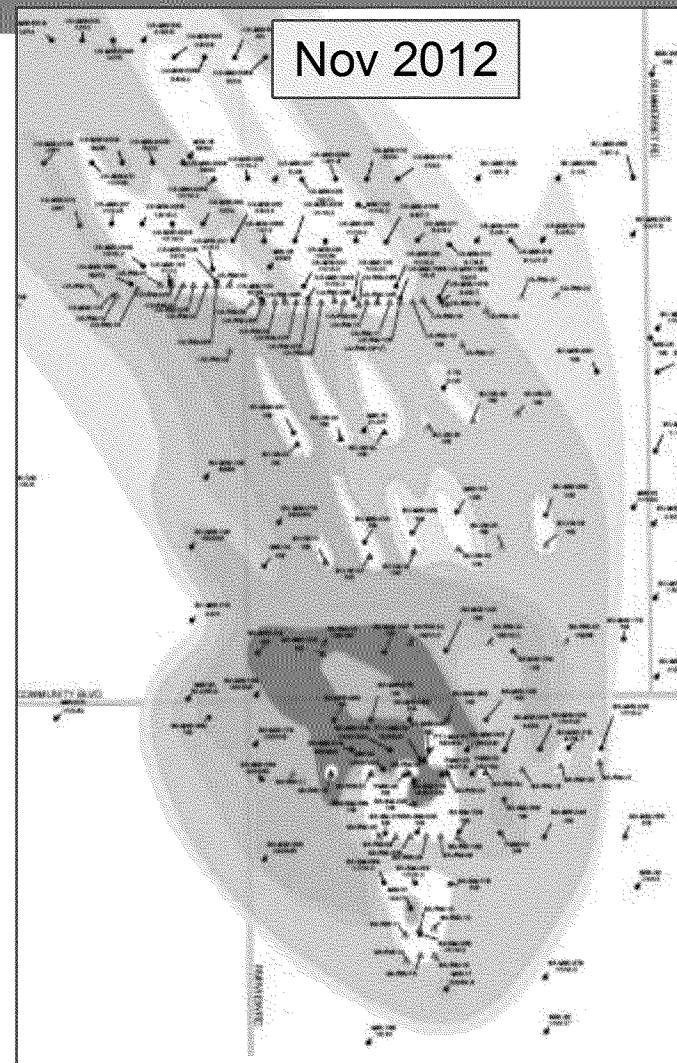
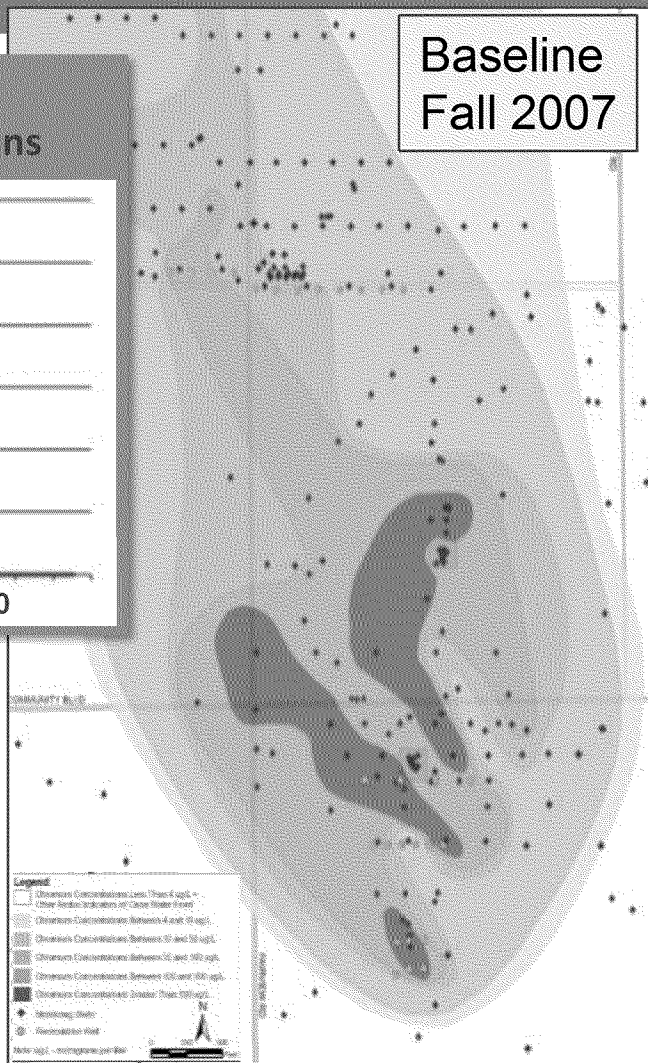
IRZ Treatment Results

Rapid decrease
of chromium concentrations



Baseline
Fall 2007

Nov 2012





Agricultural Treatment



- In the root zone, Cr6 is converted to Cr3 by contact with natural bacteria, organic matter, and iron in the soil.



Health Concerns

Media, litigation and regulatory uncertainty all contribute to resident's concern for their health and safety

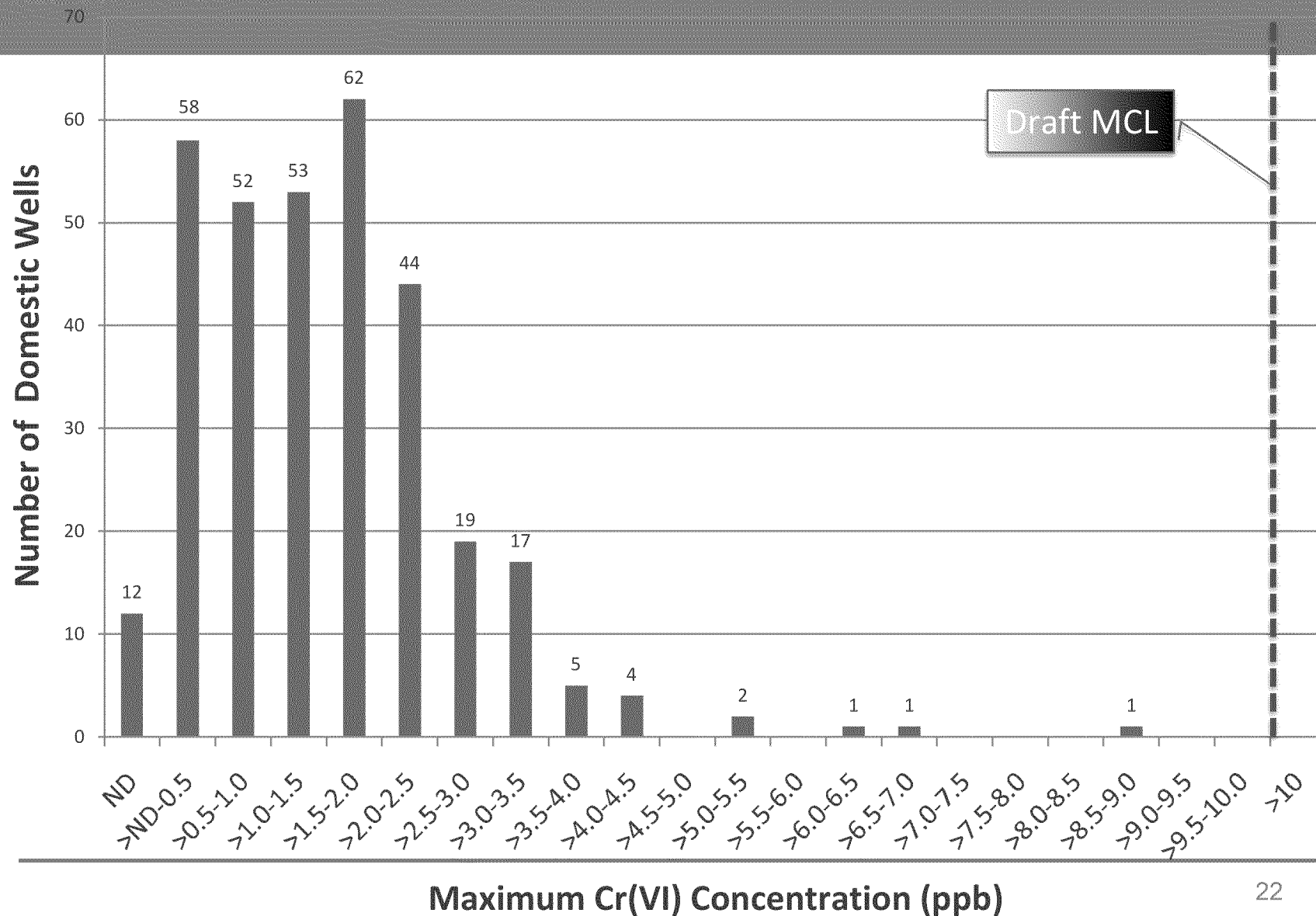


Program Challenges

- **Misperception/Lack of Trust**
 - Media Coverage
 - Litigation
 - **Regulatory Uncertainty**
 - Background
 - PHG, but no chromium 6 MCL
 - NOV for distributing commercially available bottled water
 - **Health Concerns**
-

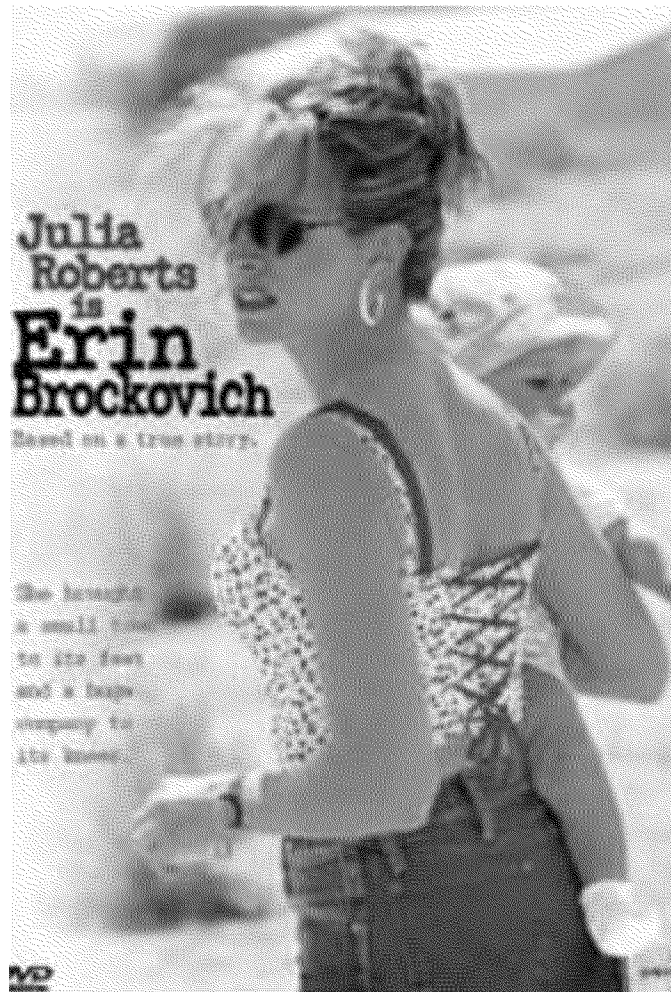


Maximum Cr(VI) Conc. at Domestic Wells Within WHW Program Area – BEFORE Treatment





Media Coverage



PBS NEWSHOUR

[Topics](#)[Video](#)[Recent Programs](#)[Teacher Resources](#)[The Rundown](#) NEWS

ARTS & CULTURE

Art Beat
Poetry Series

BUSINESS & ECONOMY

Paul Solman's
Making Sense
Patchwork Nation

EDUCATION

Extra: For
Teachers
American
Graduate

ENVIRONMENT

GLOBAL
HEALTH

HEALTH

LAW

MEDIA

MILITARY

POLITICS

Shields and
Brooks
Supreme Court

RELIGION

SCIENCE & TECHNOLOGY

Coping with
Climate Change

Science & Technology Updated: March 13, 2013, 2:00 p.m. ET

Erin Brockovich: The Real-Life Unhappy Ending

On tonight's NewsHour, Miles O'Brien reports on the decline of Hinkley, Calif., the town featured in the movie Erin Brockovich. Here's the not-so-Hollywood version of what really happened in Hinkley and beyond.



Water that is heavily contaminated with chromium-6 turns bright yellow. Public utility testing shows more than 70 million Americans drink tap water tainted by chromium-6. Photo by Cameron Hickey.



Litigation



- **Multi-party lawsuits**
- **Litigious environment**
- **Claims ongoing**



Program Approach

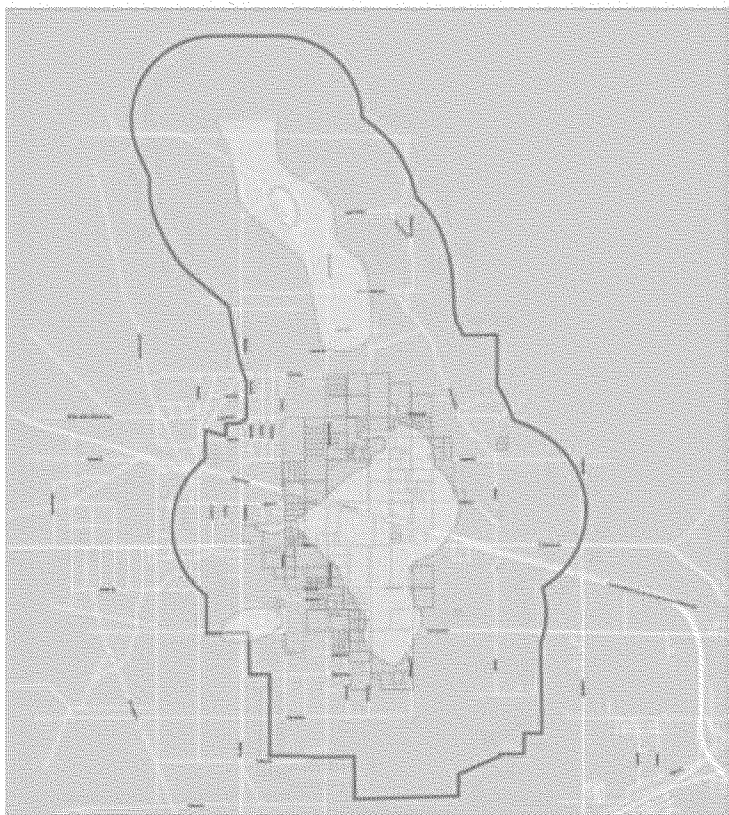
- **Take health concerns “off the table”**
- **Engage community**
- **Local Presence**





Programs

- Bottled water
- Well sampling
- Whole House Replacement Water program within 1-mile of the established plume
- 380+ homes within program area



LEGEND
Approximate outline of CTF6 or CTF1 in Upper Aquifer exceeding background values of 0.1 and 0.2 µg/L, respectively, Fourth Quarter 2012
Whole House Water Program Area Boundary



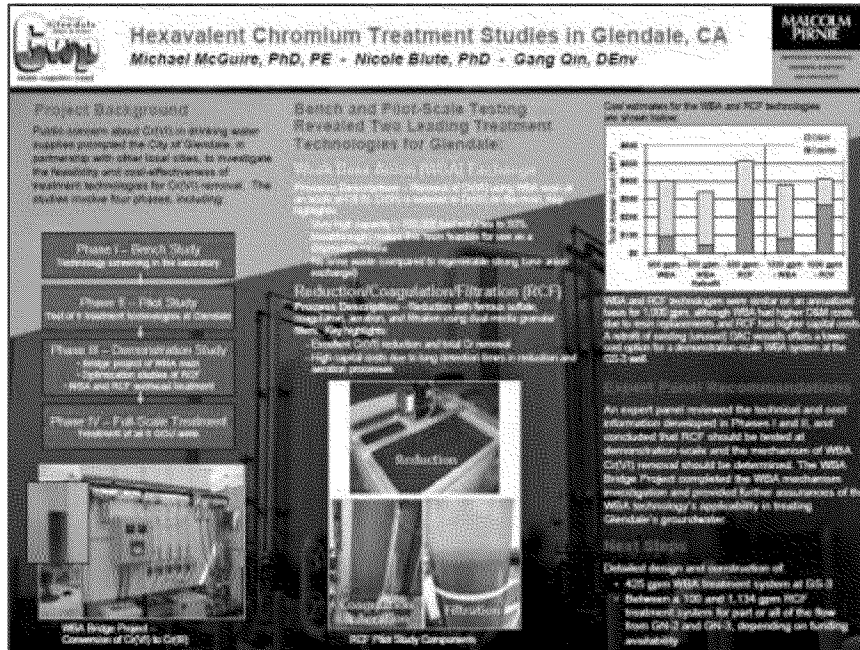
Whole House Replacement Water



- Program offered to any resident within 1-mile of the plume with any detection of Cr6 above 0.06 ppb



Water Treatment Challenges



- Treatment systems to Federal Standards – treat to 100 ug/L
- CA DPH certified Systems – treat to 50 ug/L
- Glendale Treatment study – funded by USEPA/Water Research Foundation and many others – treats to 5 ug/L

- WHRW program starts with ~5 ug/L and treats to 2 orders of magnitude lower –

0.06 ug/L



Community Engagement

Dedicated Project Website

Hinkley **Hotline**: (760) 253-7896

Email: Hinkleyinfo@pge.com

Local Community Resource Office

Bilingual Staff

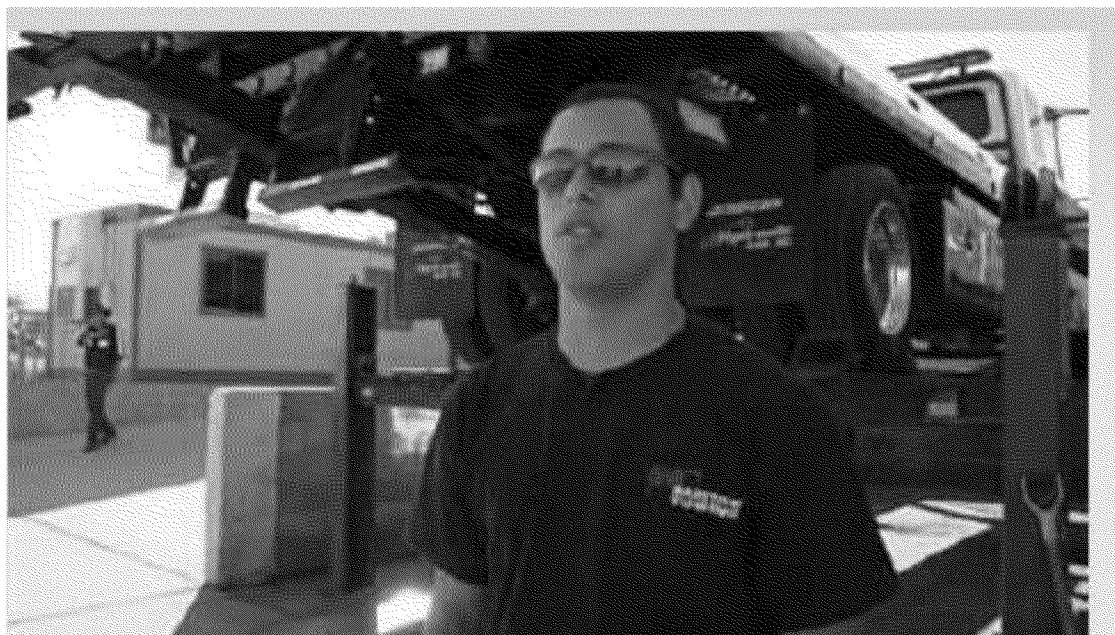
Open 9 – 5 (Mon. – Fri.)

Monthly Newsletter





Community Partnerships



Albert Gutierrez gets on-the-job training at Barstow Towing as part of the Hinkley Career Training Program funded by PG&E.

Community Day and BBQ Benefited Local 4H Club



PG&E Community Relations Manager, Jose Moreno provides students from Victor Valley College background about PG&E's work in Hinkley.





Community Advisory Committee

- **Formed June 2011**
- **Comprised of community volunteers**
- **~Monthly public meetings**
 - **Average attendance between 40 - 60**
- **PG&E provides funding for Independent Technical Advisor (IRP Manager)**
 - **Explain complicated technical issues**
 - **Address individual concerns**



3rd Party Peer Review



- **Independent 3rd Party Experts (e.g. USGS) work with CAC, Water Board & Community to understand program**



Lessons Learned

- **Regulatory Uncertainty = \$\$\$**
- **Localized issues can have state-wide implications**
- **Public perceptions do not always recognize proven science**
- **Actively Engage Community to:**
 - Educate, inform and seek support